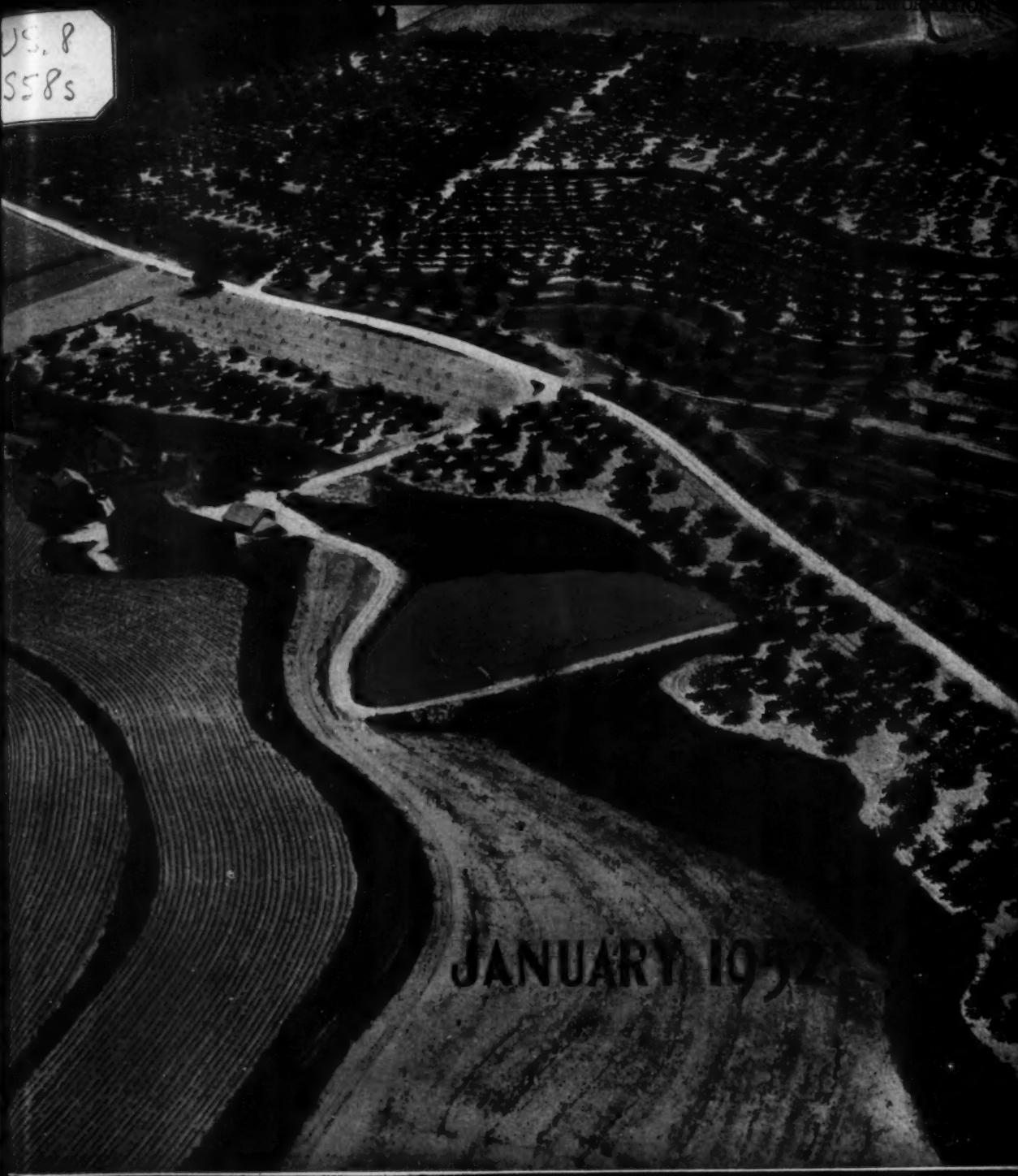


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A black and white aerial photograph showing a landscape with numerous agricultural fields. The fields are separated by white lines, likely roads or paths. The terrain appears hilly or mountainous, with the fields following the contours of the land. A winding road or path cuts through the fields, starting from the bottom left and curving upwards towards the top right. The fields themselves have a textured appearance, possibly due to different crops or soil types. The overall scene suggests a rural, agricultural setting.

JANUARY 1952

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# SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

# SOIL CONSERVATION

CHARLES F. BRANNAN  
SECRETARY OF AGRICULTURE

ROBERT M. SALTER  
CHIEF, SOIL CONSERVATION SERVICE

ISSUED BY SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE  
WASHINGTON, D. C.

JANUARY — 1952  
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## ★ THIS MONTH ★

SALTER REPLACES BENNETT AS CHIEF

Page

123

PEARL FREDERICKSEN OF IDAHO—A Profile  
By J. Boyd Price

124

A NEW GROUND COVER FOR SANDY SOILS  
By R. Y. Bailey

126

MEN AGAINST THE GLADES  
By Hugh Bennett and Glenn K. Rule

129

SAWDUST MULCH RAISES YIELD

135

NEWSPAPER RECOGNIZES TOP DISTRICTS

137

WATER CONSERVATION AIDS HEALTH  
By Chris A. Hansen

139

FORESTRY IN FARM MANAGEMENT—A Review  
By C. B. Manifold

142

NOTES FROM THE DISTRICTS

142

WELLINGTON BRINK

Editor

Art Work by

W. HOWARD MARTIN

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, under approval (August 6, 1951) of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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**PROPERTY AND LIVES CONSERVED,  
ALONG WITH SOIL.**—To supply transportation to SCS technicians in 2,374 soil conservation districts, a fleet of 1,402 automobiles and 7,376 light trucks is maintained. In the year ending June 30, 1951, SCS automobiles covered more than 16 million miles, and trucks nearly 58 million miles.

Following the close of World War II, the Service fleet was in a run-down condition brought about by attrition due to the war. It was recognized that careful attention had to be given to maintaining what vehicles remained in order to meet the requirements of expanding conservation activities. New vehicles were needed and a program of gradual replacement was worked out.

Also, beginning in 1946, an active program of maintenance was inaugurated. In each region traveling mechanics are employed to inspect each vehicle at least twice each year and to see that it is properly cared for mechanically and as to safety of operation. This program is paying off. Cost of operation and maintenance for the 1946 fiscal year for each mile traveled was \$0.03169 for automobiles and \$0.03861 for pick-up trucks. These costs have been gradually reduced over the ensuing 5 years to \$0.03012 and \$0.03390 for automobiles and trucks, respectively. In view of increased costs of gasoline, oil, labor, and parts, the reduction in cost of operation is all the more gratifying.

(Continued on page 141)



**FRONT COVER.**—This fine air view by Gordon S. Smith shows contoured orchard, diversion terraces, and farm pond on the property of George Follweiller, of Stony Run, Berks County, Pa.

SALTER  
 REPLACES  
 BENNETT  
 AS  
 CHIEF

The Soil Conservation Service has a new Chief. As this issue was going to press, announcement came from the Secretary of Agriculture of the appointment of Dr. Robert M. Salter to the command held so many years by Dr. Hugh H. Bennett.

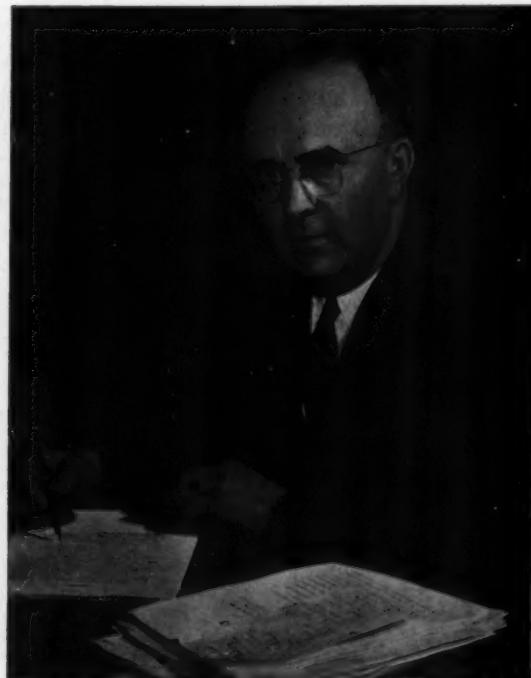
The new Chief is an outstanding scientist and administrator, thoroughly versed in the problems and opportunities of the national soil conservation program. Since 1942 he had been Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Dr. Bennett will serve as a Special Assistant to the Secretary, in charge of conservation and resource matters.

See the next issue for more details.



Dr. Hugh H. Bennett.



Dr. Robert M. Salter.

## DISTRICT PROFILE

PEARL FREDERICKSEN  
of  
IDAHO

The president of the Women's Auxiliary of the National Association of Soil Conservation Districts is a trim little farm wife who overflows with energy.

She is Mrs. Don G. (Pearl) Fredericksen, who lives near Gooding, Idaho, and grew up on a farm in a nearby community. She was graduated from the St. Alphonsus hospital school of nursing at Boise, and vowed she'd never marry a farmer.

But she became the Gooding County nurse and met Don. She's a blonde with a modish bob, and she manages to keep her nails manicured even though she does all manner of farm work in addition to her housework.

Mrs. Fredericksen, a vice president of the Women's Auxiliary of the Idaho Association of Soil Conservation Districts, was elected president of the National Association auxiliary at the Oklahoma City convention last February. Fifty-two wives of district supervisors, representing 23 States, were present at the organizational meeting.

Mrs. Fredericksen has great hopes that the 1952 convention of the National Association will give impetus to the ladies' auxiliary. She is corresponding with women of several States. They have made arrangements to have business sessions and a luncheon for all wives who accompany their husbands to the Cleveland meeting. Mrs. James Lane of Xenia, Ohio, is in charge of the distaff side of convention arrangements.

Mrs. Fredericksen has two primary goals. The first is to get ladies' auxiliaries organized in each State and through them to get auxiliaries functioning in each district. The other goal is to help improve the educational work in soil and water conservation. In this endeavor she is not only thinking of working with schools and colleges, but also with State departments of education and women's groups, both rural and urban.

"Farming is more of a whole-family effort than almost any other business I know," said Mrs. Fredericksen, "and I think every one of us farmers' wives should know what soil conservation is all about."

"We have no intention that the auxiliary will



Mrs. Pearl Fredericksen.

take over any function of the State or National District Associations, but we feel we can assist them to get everyone in the Nation acquainted with soil conservation. Our efforts, I believe, will be in the field of education."

Mrs. Fredericksen is a good friend of Mrs. Frank Goodwin, of Sweet, Idaho, president of the Idaho ladies' auxiliary, which was formed because several wives who always accompanied their husbands to the State meetings wanted to do more than go on tours and play cards. The Idaho auxiliary was the first to be formed. Washington now has such an organization and so does Minnesota, where it is known as "Daughters of the Soil."

The Fredericksens live on the place to which Don moved with his family in 1912. At that time what is now a flourishing farm was only a sagebrush flat. It is in the "Magic Valley" section of south central Idaho.

Mrs. Fredericksen became interested in soil and water conservation through her husband, a tall strapping fellow with a flashing smile.

Fredericksen was one of the organizers of the Gooding Soil Conservation District and has been chairman of the board of supervisors since it was created.

The Fredericksens have more than half of their 400 acres of irrigated land in grass-legume mixtures for pasture and hay. Don enthusiastically advocates the use of grass with alfalfa for hay. Some say that the initial "G" in his name stands for grass. They follow their farm conservation plan with a rotation of 4 years of hay, 1 year of grain, 1 year of beans, and 1 year of grain with a new seeding of hay.

Under their conservation plan the Fredericksens were able to make a great deal more efficient use of their supply of irrigation water. This was achieved by precise leveling of the fields to be irrigated, improvement of water distribution, and applying only the amount needed to wet the root zone.

The saving on water permitted the Fredericksens to irrigate 35 more acres than formerly.

The Fredericksens are livestock raisers. They have approximately 200 head of whitefaces which are grazed on Federal grazing land and some 2,000 acres of private and leased land in the summer.

Don and Pearl are active in community affairs. Don is a member of the draft board and the school board. He is president of the Thorn Creek Cattlemen's Association, Inc. He is a Mason and an Elk, and Pearl a member of the Eastern Star and the Elks ladies' auxiliary. They helped raise funds for the Gooding Memorial Hospital, a 35-bed structure built while Don was a member of the hospital board.

Still a registered nurse, Mrs. Fredericksen confines her activities in that field mostly to nursing her friends when they're hospitalized. She delivered five babies of neighboring farm wives shortly after she married Don, including a set of twins. The neighbors customarily say, "Phone for the doctor and get Pearl to rush over."

Pearl loves the outdoors. She fishes with others of the family in mountain streams, lakes, and the Snake River. Every fall she goes hunting with her husband for deer, antelope, and elk. They make their camp in Idaho's rugged Selway Primitive area. She has her own big-game rifle with telescope sight.

There are two sons, Gene, 10, and Bob, 13. The boys are 4-H Clubbers with baby-beef and hog projects.

She laughs when she tells about her birthday and Mother's Day gifts this year from her boys. She received a pair of waders, a fishing creel, and a new fly rod—all the youngsters' own idea.

She's a typical farm wife in many ways. On occasions, she and the boys milk their 10 dairy cows. In harvest season she's in the field and can operate all of the farm implements. She doesn't hesitate to pick up a shovel and help set the irrigation water. But above all she has that one typical trait of neighborly farm women: She's a wonderful wife and mother who is entirely unselfish and will do anything for her neighbors and friends.

—J. BOYD PRICE

#### BIOLOGY TEACHERS LAUNCH PROJECT.—

The teaching of conservation in biology courses will be encouraged by the National Association of Biology Teachers under a 3-year project to be conducted with the assistance of a grant-in-aid from the American Nature Association.

The association, through State chairmen and committees, is now gathering descriptions of outstanding programs already in use. The committees particularly want to know how various teaching techniques have been used to increase interest in conservation, such as field trips, films, camps, school forests, nature trails, use of community resources and agencies, group work, school-ground projects, fairs, exhibits, and so on. Local, State, regional, and national workshops are planned to permit biology teachers and others to develop adequate criteria for good teaching, to share experiences, organize descriptive material submitted by teachers, and to assist in developing projects and programs in schools interested in initiating a stronger conservation program.

A national committee, consisting of the State and regional chairmen, and an executive committee of 7 will guide the project and be assisted by an advisory committee of representatives of 25 national conservation groups.

Anyone willing to assist in the project in any way, or knowing of biology teachers who are doing an outstanding job in this field, are requested to write to Dr. Richard L. Weaver, Project Leader, P. O. Box 5424, State College Station, Raleigh, N.C.

**TO KEEP INFORMED.**—Funds have been voted by the board of directors of the Tehachapi (Calif.) Soil Conservation District to provide each farmer within the district with a 1-year subscription to SOIL CONSERVATION Magazine.

On July 1, 1951, this district included 138,350 acres in Kern County, distributed among 242 farms. Roy E. Ballard is the work unit conservationist.

# A NEW GROUND COVER FOR SANDY SOILS

By R. Y. BAILEY



Bahiagrass made vigorous top growth and another crop of seed, which was harvested. This heavy growth of grass is evidence of the value of the clover residue on this sandy field. The photograph was made last August.

We have a lot of land in both the Atlantic and Gulf Coastal Plains that is too sandy for most pasture grasses. This is often called poor sandy land. Recent developments in the use of Pensacola Bahiagrass and reseeding crimson clover show that much of this poor land is good, if we use it right.

We learned several years ago that Pensacola Bahiagrass would survive on poor sandy soils. The forage was good for spring grazing, but got coarse and tough later in the summer. As Oscar Hurst, a farmer in Florida, expressed it, Pensacola Bahia was a yellow grass. This farmer learned after applying nitrogen fertilizer that Pensacola Bahia was a green grass. Our problem then was to supply enough nitrogen to make this a green grass.

Reseeding crimson clover sown on Pensacola Bahiagrass sod at Soil Conservation Service nurseries at Americus, Ga., and Thorsby, Ala., made good late winter and spring growth. After clover seed ripened in the spring, the grass made vigorous growth. The grass was green and succulent and the green color remained into the fall.

Note.—The author is regional research representative, Soil Conservation Service, Spartanburg, S. C.

Clover came back to thick stands in the fall, if grass tops were mowed and removed for hay. Where very dense grass was mowed and left on the ground, clover came up only in narrow strips where the divider board on the mowing machine pushed the grass aside and exposed the soil surface. This was useful information to guide us in the management of a Bahia-crimson clover combination under farm conditions.

While we were learning from plantings of clover on Bahiagrass at the nurseries, farmers were making plantings of their own. Russell O'Barr, work unit conservationist in the Yellow River Soil Conservation District, Crestview, Fla., wanted something better than pale, yellowish Bahiagrass. He talked with J. D. Warner, vice director in charge of the North Florida Experiment Station at Quincy. When Warner told O'Barr that he thought crimson clover was a good legume for that section, O'Barr believed him. In fact, believing in J. D. Warner is the usual thing in that part of Florida.

O'Barr's next job was to get some farmers to plant reseeding crimson clover on Bahiagrass. C. F. Manning called on O'Barr for help in planning the use of some cut-over pine land. In the early

summer of 1949, the scattered pine trees, gallberry bushes, and other woody growth were cleared off and a seedbed prepared. Early in the fall, Manning sowed a mixture of Pensacola Bahiagrass and reseeding crimson clover. The land was limed and fertilized. Crimson clover furnished late winter and early spring grazing in 1950. Cattle were removed in the spring and a crop of clover seed was harvested. Following the clover-seed crop, Bahiagrass made a good seed crop. After harvesting seed, Manning pastured the grass. He did not have enough cattle to keep the grass grazed closely and it had a heavy top growth by fall. This top growth was mowed and removed for hay. A thick volunteer stand of clover came in the fall.

Several other farmers in this district went along with O'Barr and tried some of the Bahia-crimson clover combination. G. C. Johnson, Baker, Fla., sowed Pensacola Bahiagrass seed in the spring of 1947. He sowed reseeding crimson clover seed on the surface, without covering, in late October 1947. He pastured both clover and grass in 1948 and each year since. His dairy cows take the grass tops off closely enough in summer for good stands of clover to come in the fall. He got thick stands of volunteer clover in 1948, 1949, and 1950. The clover residue left on the land each spring made his summer grass deep green in color. His dairy cows grazed the Bahiagrass right on through the summer. Johnson has not harrowed the soil since the initial planting in the spring of 1947.

John Senterfitt, Laurel Hill, Fla., sowed Pensacola Bahiagrass seed in May 1947 and sowed inoculated crimson clover seed on the undisturbed ground surface in late October of the same year. The clover was grazed in the spring and allowed to make seed. Bahiagrass was grazed in the summer and fall. Clover came back in thick volunteer stands in 1948 and 1949.

Senterfitt had too many cattle for his acreage of pasture and they grazed the clover so closely in the spring of 1950 that the seed crop was light. He got another good stand of clover that fall, but was short of feed and grazed the pasture so closely that the clover made little growth. He increased his acreage of this mixture and also added a field of Argentine Bahiagrass so that in the future he can manage his pastures properly.

C. B. Johnson, Geneva, Ala., followed a different plan of seeding grass and clover. He sowed reseeding crimson clover on 42 acres of good Class I and

Class II cropland in November 1948. Cattle grazed the crimson clover in the spring of 1949 until about April 1, when they were removed to let clover seed mature.

After crimson clover seed was harvested, the land was disked thoroughly during the summer and seeded to Pensacola Bahiagrass in August 1949. The grass came up to a good stand and the seedlings survived the mild winter. Protection by the volunteer crop of crimson clover probably helped to carry the grass seedlings through the winter.

Crimson clover was again pastured until about April 1950 and another seed crop was harvested. Later in the summer of 1950, Johnson harvested 302 pounds of grass seed per acre. Cattle were turned in again after grass seed was harvested, but the pasture was not stocked heavily enough for close grazing. The surplus grass was also mowed with a rotary mower. Even after mowing, the cover of grass was too heavy for best germination of clover seed.

Dry weather and unusually severe cold in late November delayed the clover stand in the fall of 1950. The late stand of clover gave little grazing in the spring of 1951, but a good crop of seed was harvested. Cattle, at a rate of one and one-half mature cows with calves per acre, were turned on the grass after clover seed was harvested in the spring of 1951. After 30 days, cattle were removed to let the grass make a seed crop.

A few farmers sowed Pensacola Bahiagrass seed immediately after it was harvested. Good stands resulted. This method saved cleaning, drying, and other processing of the grass seed. Up until the fall of 1950 when a late November freeze killed seedling plants, it appeared that seed of this grass could be sown almost any time. Seedlings that came up after early fall plantings survived the winters in other years. We don't know how often we may expect winter injury to seedlings. Our experience over the past several years indicates that spring, early summer, and late fall will be the safest seeding dates. Seedlings from spring plantings survived every year. Summer and early fall seedlings were thinned by cold in 1950. Seed planted in late fall did not germinate until the following spring.

The Pensacola Bahia-reseeding crimson clover combination grew well on a variety of sandy soils. Soil conditions ranged all the way from the very best Class I sandy loams to deep, poor sandy soils.



C. F. Manning, Okaloosa County, Fla., harvested reseeding crimson clover seed in the spring and Pensacola Bahiagrass seed in the summer of 1950. He pastured and mowed grass tops off in the summer and early fall to let the clover come back to the thick volunteer stand shown in this picture which was made early last May. The view shown at the beginning of this article is of the summer grass that followed the clover seed crop.

Best growth was on the better soils, but we learned that with proper treatment the poorer soils will grow these plants.

We believe this grass-clover combination has a useful place in a Coastal Plain grazing program. It is particularly promising for the deeper, poorer sandy soils. Grazing results at Tifton, Ga., indicate that Coastal Bermuda is a better pasture grass than Pensacola Bahia for sandy loams and other more productive pasture soils in the Coastal Plain areas. It is the policy of operations personnel in the Soil Conservation Service to recommend Pensacola Bahiagrass for pasture on soils that are not well adapted to Coastal Bermuda. We need more exact information about the relative value of these two sandy-land grasses under exactly comparable conditions. Studies that are now in progress at Tifton should give us this information.

What about soil treatment? Farmers who are most successful with this plant combination have one thing in common—they fertilize liberally and regularly. They apply 500 to 1,000 pounds per acre of a complete fertilizer at planting time. This application of complete fertilizer is particularly im-

portant on the poorer soils. A little nitrogen is beneficial to the first-year clover seedlings. They maintain the vigor of volunteer stands with annual applications of 0-14-10, 0-12-12, or similar fertilizers, at rates of 500 pounds, or more, per acre each year. Most farmers apply ground limestone at a rate of about a ton per acre once every 4 or 5 years. They usually apply a little borax with their fertilizer.

This grass-legume combination has good possibilities as a protective sod in crop rotations on sandy soils. The sod gives perfect surface protection and the coarse roots and stems of Bahiagrass fill sandy soils with a durable type of organic matter. The green clover, of course, adds a succulent type of leguminous material to enrich sandy soils.

We have plowed several areas of Pensacola Bahia sod at the Americus, Ga., and Thorsby, Ala., nurseries. We learned from these areas that the grass sod should be turned in the summer or early fall in advance of planting the land to a cultivated crop in the spring. Where sod was broken and disked in the summer or early fall, most of the grass was killed. Summer or early fall breaking of the sod also allowed us to grow lupine or some other winter legume for spring green manure. Caley-peas and vetch volunteered after sod was broken at Thorsby. Crimson clover should volunteer in the fall after grass sod is plowed in the summer, but we have not tried it as yet.

Where we left the sod until spring, we were unable to kill the Bahiagrass and it interfered seriously with the cultivation of the summer crop. Seedling grass plants that came up during the spring and summer were not troublesome. We are quite sure from our experience that Bahia will not be a pest on cropland, once the old sod is killed.

The effect of plowing under a heavy sod of Bahiagrass was noticeable into the second year of cultivation. Partially decayed grass stems were still present in the fall of the second row-crop year. Growth of corn, grain sorghum, and winter legumes was noticeably better following a stand of Bahiagrass, Caley-peas, and vetch than it was where legumes alone were turned under. The combination of coarse grass and succulent legumes appeared to give us better results than either plant grown alone.

Bahiagrass-crimson clover combinations are being studied in our research program. We want

(Continued on page 141)

By HUGH BENNETT and GLENN K. RULE

## MEN AGAINST THE GLADES



Typical scene: State highway 25, bordering canal; the windbreak is Australian pines. Photo by Everglades Experiment Station.

**I**F YOU LIVE in eastern United States and like string beans, lettuce, corn on the cob, sweet peppers, and several other winter-grown vegetables fresh from the soil, you can thank south-Florida farmers for licking some of the tough land, fire, and water problems of the Everglades.

For 40 years men have been struggling with this vast Glades area—its peat and muck lands, drought and fire, sand and rock and water. Across the years it has been subjected, at various stages of "development," to bog conditions, drainage, drought, flood, fire, legitimate and questionable land sales, and confusion of titles and land values. "You want to think of the Glades," an engineer explained, "as the biggest, flattest, blackest, sometimes the wettest and again the driest and burningest area you ever saw." His comment helps explain why early explorers—English, French, and Spanish—hugged the seacoast and avoided the forbidding morass of muck and peat.

If you know your Florida geography, you know the mammoth fresh-water lake with the pleasant name of Okeechobee. Its north shore roughly marks the northerly limit of the Glades; from its south shore the area, as commonly understood, extends approximately 90 miles to the mangrove swamp bordering the Gulf. The lake itself is almost 37 miles from north to south. Apart from

a triangular area on the west coast and a narrow sandy ridge along the east coast, together with a stretch of rock land and marl to the south, the Glades area covers almost the entire lower part of the Peninsula. This vast tract of more than 75 hundred square miles is now included in the Everglades Drainage District. It is one of the largest known bodies of peat and muck in the world.

Geological records suggest that, off and on, Mother Nature was a bit undecided whether or not to leave this part of Florida above or below water. Anyway, back through the ages, she has tried it both ways more than once. Right now the land mass is above water, but not much, for the highest elevation is only about 21 feet above sea level.

The general topographic features of the Everglades are those of a vast flat plain, characteristic ally treeless and gently sloping to the south and, in the lower portion, to the southwest. From the shore of Lake Okeechobee, where the elevation is about 21 feet above sea level, there is a gradual fall of between 0.2 to 0.3 feet per mile (over a distance of about 57 miles along the New River Canal) to the eastern edge of the Everglades. The natural drainage of the region for the most part followed the southwesterly slope through sloughs whose original trend was in that same direction. This natural drainage system was insufficient, originally, to carry off the rainfall plus the overflow from Lake Okeechobee.

In the southeasterly marl-rock section there are frequent small dome-shaped mounds of peat rising a foot or more above the surrounding wet areas. These are covered with wild rubber trees, myrtle, bay, and other trees, and are known as "keys." The larger, timbered mounds in the deep peat area to the north are sometimes referred to as "hammock land."

Beginning about 1912, the natural drainage was violently interfered with by the installation of an extensive system of drainage canals. Quickly the drainage proceeded to a point where dry conditions prevailed much more frequently, and noticeable changes occurred in the vegetation in many parts of the Glades. The encroachment of myrtle, willow, bay, and fennel are the result of burning off the sawgrass. If fires had been kept out, sawgrass would still predominate.

The frequency of fires has increased greatly. During the annual dry seasons, many thousands of

acres of peat land have burned over. In places the accumulated remains of water-loving vegetation (peat) have burned down to or close to bedrock, lying at depths ranging from 2 or 3 feet to a maximum of about 12 feet. In the practical sense the more severely burned land has little or no further value for agriculture. As roughly estimated, several hundred thousand acres have been thus severely burned, or burned to depths of from 2 to 3 feet or more. The seriousness of the situation is evidenced by three critically important facts: First, the depth to bedrock is generally only about 2 to 6 or 7 feet below the surface; second, the predominant soil of the Glades proper—peat—undergoes rapid oxidation on drying, with subsidence as the disrupting result; and third, in 1915 the proportion of inflammable (when dry) peat land in the Glades ranged, according to findings of the soil survey of the Fort Lauderdale area (probably representative of soil conditions in a large proportion of the Glades area), up to 85.7 percent of the surveyed area of 225,000 acres.

When wholesale drainage operations began around 1912 there was, so far as can be determined now, no clear-cut goal beyond getting the Glades into cultivation as rapidly as possible. Great drainage canals, which were to be the key to rapid development, were put through with much too little consideration of the real capabilities of the land. No attempt at scientific classification of the soils was made until the Fort Lauderdale soil survey (Field Operations, Bureau of Soils, 1915). No land-capability survey was made until the Soil Conservation Service, cooperating with the Florida Agricultural Experiment Station, completed such a survey in 1943, "Soils, Geology, and Water Control in the Everglades Region," prepared by SCS and published by the Florida Agricultural Experiment Station.

These surveys and studies of the region by the Service were begun in 1939 under the Everglades Project authorized by special legislation carrying an appropriation of \$75,000 (Public 159, 76th Congress).

This work in the area had as its most important initial purpose protection of the extensive peat lands (organic soils) from burning and subsidence. This, it was felt, would first call for topographic and land-capability surveys and setting aside blocks of unused land for protection against fire and subsidence by holding water at high enough

levels to maintain a sufficiently wet condition to prevent aeration and burning. From the standpoint of safeguarding the valuable peat lands, this was soil conservation in the very best sense.

In presenting testimony before the Appropriation Committee on the Agricultural Bill (Hearings, Senate Subcommittee on Appropriations, 76th Congress, First Session, pp. 717 to 723, inclusive, April 24, 1939), H. H. Bennett said, in answer to a question as to whether or not the appropriation asked for in Senator Pepper's bill—"For carrying out engineering operations and other . . . measures (including fire control and irrigation construction work to eliminate fire hazards), in the Everglades region of Florida, \$1,000,000"—was primarily to control the fires: "I would consider it primarily a fire-fighting item to begin with but on such a planned basis as to eventually fireproof these soils."

Some of the continuing testimony on this proposed appropriation was as follows:

**SENATOR CHAVEZ:** In dealing with the fire hazard will you still protect the drainage end so that the land can be used for farming?

**DR. BENNETT:** Yes, sir; it would be necessary, Senator, to establish gates in the canals so that you can raise or lower the water table . . . In those areas which are laid aside as reserves until they are needed for cultivation, we would let the water stand . . .

Again, as a matter of interest:

**SENATOR PEPPER:** Now, you think that this \$1,000,000 will be enough to get your . . . program under way?

**DR. BENNETT:** Yes, Senator, I think so. I really think, if I may say so, that probably it would be difficult to spend a million dollars during the first year. I think we should start gradually . . . and feel our way carefully, because it is a new problem . . . a very difficult problem, highly complicated.

This was a preview of the situation, with only observations and experience to go on. The preview proved correct, even though the findings of the work have been far more valuable than was foreseen around the great mahogany table there in the Appropriations Room on April 24, 1939.

Twelve years later SCS has not spent anything like a million dollars on the entire Everglades project (\$662,724 has been spent to date), but I would evaluate the worth of the work accomplished at many millions of dollars—to the State of Florida and to the Nation.



Wooden lugs are bolted on narrow-gage tractors for travel over soft peat soils. Photo by Everglades Experiment Station.

In much, if not most, of the agricultural area the principal problem is to provide the right control of water at the right place and time. If the water table is lowered too much by excessive drainage, the area is usually seriously damaged by fire, because the peat, consisting of almost pure organic matter,<sup>1</sup> burns like tinder when dry—and the Glades do dry out on occasion. If, on the other hand, the water table is permitted to remain too high because of inadequate drainage, crops suffer and perhaps die because the feeding zone of plants is severely restricted.

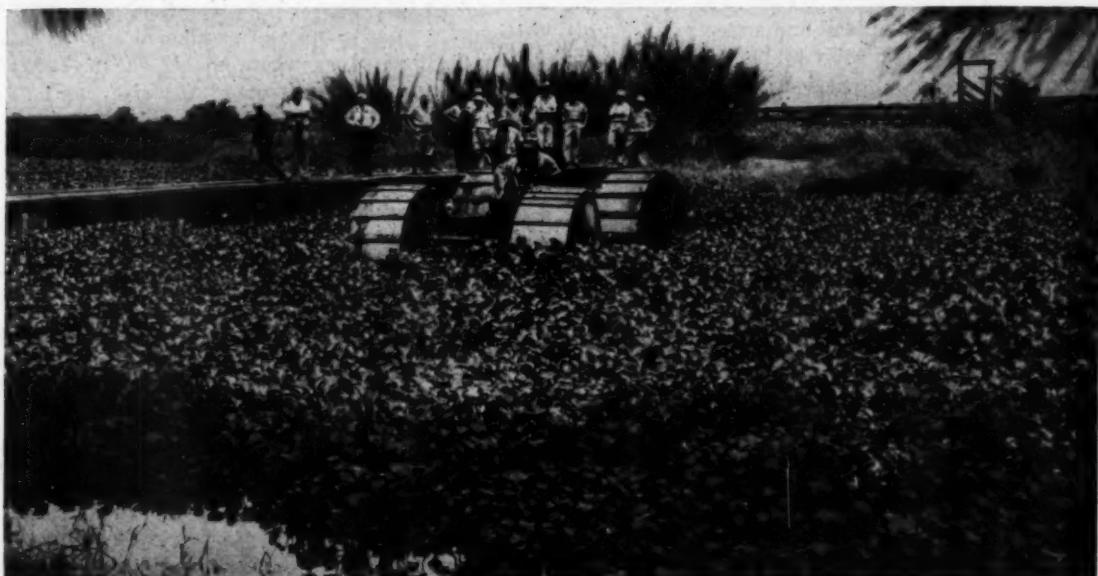
<sup>1</sup>Of 354 samples of "fibrous peat," collected during the Fort Lauderdale, Fla., survey, Field Operations, Bureau of Soils, 1915, 169 contained 50 percent or more of combustible material ("loss on ignition"—but largely organic matter). These samples ranged in depth to bedrock or sand over rock from 18 inches to 11 feet, 8 inches. Only 8 samples of the 354 were as deep as 10 feet, 10 inches, and only 8 were less than 2 feet deep.

Control of water in lower Florida is not the exclusive responsibility or concern of farmers and truck growers. Because of excessive drainage and pumping, the water supply of populous areas has been reported as susceptible at times and in some places to intrusion of salt water.

Water management probably would be less difficult for farmers and drainage engineers if the rainfall were more evenly distributed. While most of the area receives between 50 and 60 inches of rain during the year, a few extremely heavy downpours may account for a considerable proportion of the year's rainfall. On November 6 and 7, 1932, for example, one such rain slashed down 21.22



Modified moling machine, one of the many special pieces of equipment required. Photo by Everglades Experiment Station.



Glades buggy plowing through the hyacinths. Photo by Everglades Drainage District.

inches in 24 hours at the Cane Breeding Station at Canal Point. Damaging floods sometimes occur when crops are in the ground because of the excessive cost of providing ditches large enough to handle the runoff from the extremely heavy rains. On the other hand, droughts sometimes occur at critical times, making it necessary to irrigate in order to prevent severe crop losses. It is common practice for farmers to pump water out of dike-enclosed fields into the canals during wet periods and to pump water from the canals back into the fields in dry times.

Water control is utterly essential to successful cultivation of the Everglades. In the first place, the predominating peat lands are subject to two kinds of burning, both of which lower the surface of the land. In dry times, these organic soils—some of them containing 90 percent of vegetable matter—burn deeply and persistently, once started by some such misadventure as dropping a lighted cigarette into a crack in the soil. They also burn—more slowly but nonetheless surely—when exposed to the air by cultivation. Hot fire is not involved with this latter process; it is the cold or natural form of burning, called oxidation. This process gradually lowers the surface of the ground by what is called subsidence. Bench-mark records show the rate of subsidence to amount to as much as 5 feet in 40 years.

The Soil Conservation Service was invited to help solve some of the land and water problems of the Everglades region early in 1939; in fact, Congress, as pointed out previously, made a special appropriation for the purpose.

Realizing the importance of the underlying geological formations in relation to water-control problems throughout the Glades, the Service invited the United States Geological Survey to help with studies of the underlying rock formations. As a result, 89 exploratory test wells were drilled in the Everglades territory. Of these, 30 were installed jointly by the Geological Survey and the Soil Conservation Service. Most of the rest were put down by other agencies. The wells ranged in depth from 50 to 812 feet.

In 1943, the Service completed a topographic survey of the area. This was accompanied by a land-capability survey, the two being made concurrently.

This portrait of the land was necessary for guiding its sound use and protection.

The completed survey<sup>2</sup> of the Everglades covers 4,791,294 acres. The various land conditions are covered by five capability types, as shown, together with the individual areas, in the table below.

#### Land Types, Florida Everglades

Land types	Suitability for use	Extent Acres
II	Suitable for cultivation with simple farm practices	265,988
III	Suitable for cultivation with intensive practices	1,470,956
IV	Suitable for limited cultivation	1,784,247
V	Not suitable for cultivation, but suitable for pasture	131,805
VIII	Not suitable for cultivation, pasture, or forestry, but suitable for wildlife	1,138,298
	Total	4,791,294

Until these surveys were completed, Everglades planning for agricultural utilization had to be done without adequate physical facts. It wasn't known, for instance, what the soil consisted of, or what it was good for. No one knew precisely what kind of rock underlaid the soils or how this rock would affect the use of the land.

The capability survey showed, among other things, that much of the Glades area would have to be used for water storage if agricultural operations were to be sound and permanent.

In the first place, where should the necessary water-storage areas be located? Certainly, on land of least value, if such could be used.

The survey has provided the answer to this highly important matter, together with other indispensable information, such as the location and character of the bedrock. Some types of underlying rocks are characterized by an abundance of holes, which make them as permeable to water as a sieve and, therefore, unsuitable as a base for water-retention dikes. Dikes are expensive and must be built where the chance for seepage is least. Part of the underlying rock—the solid variety—is admirably suited as a platform for water-retention dikes.

The soils vary from droughty sand along the outer edges to fibrous peat in the interior, too

<sup>2</sup>"Soils, Geology, and Water Control in the Everglades Region," prepared under the direction of the Soil Conservation Service and published by the Florida Agricultural Experiment Station, 1948. The field work was carried out chiefly by K. Davis, B. S. Clayton, J. C. Stephens, M. H. Gallatin, and A. R. Stephens.



Typical peat fire in the Glades.

coarse for cultivation without first conditioning it by pasturing.

Conventional methods of transportation were attempted in the earlier survey work—that is to say, by foot. Continuous sloshing, knee deep or deeper, through water-soaked peat and muck, was very exhausting, not to mention the dense growth of razor-edged sawgrass, which was uncomfortably abrasive. "Swamp-feet," followed by peeling, was a common complaint.

On the coastal ridges and sandy prairies ordinary pick-up trucks with oversized tires were satisfactory, but in the southerly and westerly sections where sandy lands are interspersed with sloughs, keys (small hammocks or vegetated hummocks), rock areas, soft marl, and wide stretches of sawpalmetto, transportation called for a "converted" half-ton truck, with heavy-duty rear tires and extra transmission. On the sawgrass peat and muck lands, with frequent clumps of myrtle and "gator" holes, the crawler-type tractor with long cleats proved adequate for the job.

Probably the most notable vehicle for transportation in the Glades proper was the "air boat." Where water was too shallow for a boat with submerged propeller, and where the peat was soft and deep, these craft propelled by airplane engines proved highly satisfactory. They were used principally in water-covered peat and slough areas. Here they covered the country, with a sensation of "going places" as on an ice sailboat. They were useless, however, on rocky land and land with tree stumps.

The "Glades buggy" with its 3 axles and 12 tires was most in demand for the territory south of Tamiami Trail. But the vehicle most talked about for Glades travel at present is the amphibious weasel, designed during the war for use by the Armed Forces. It was especially useful in soft soils adjacent to ponds or water channels too deep for nonfloating vehicles. One of the surveyors using it said: "It would crawl out of the water, shake itself, and then move off along a hard road at 25 miles an hour."

Drainage of the Everglades dates back to about 1912. In rapid succession the Miami, Bolles, North New River, Hillsboro, and West Palm Beach canals were constructed to carry water across the Glades from Lake Okeechobee to the sea.

To reduce subsidence and control fires, dikes built of local materials—muck, peat, and rock—are to hold water for keeping unused land saturated. When built of peat, the dikes are subject to subsidence—another factor contributing to the difficulties of water control.

The dikes proposed in the Soil Conservation Service control plans are to be protected with such grasses as Bermuda, maidencane, St. Augustine, Bahia, Para, Rhodes, Carib, centipede, pangola, and others.

The earlier measuring devices used to determine water levels were usually placed near canals and roads for convenient access. In order to determine what was taking place with respect to water levels back from the canals and roads, another method was adopted. It would have been too expensive to send men out into the Glades on regular schedules to read water-level instruments. Accordingly, a method was developed by SCS for reading measuring devices from airplanes. A series of wells was constructed about midway between the Miami and New River canals. Each well was equipped with a float, to which a cable was attached. This was looped over a bicycle wheel suspended on a frame several feet above ground. A weight attached to the suspended end of the cable was sufficient to turn the wheel when the water level changed. Large clock-like figures were painted on a circular dial around the wheel.

At the request of SCS technicians, Navy pilots, stationed at Fort Lauderdale, read the water-level figures shown on the clocks. By crisscrossing the area, only 2 hours' flying time was required to



Ramie, a fiber plant now being grown commercially in the Everglades. Photo by Everglades Experiment Station.

read the half dozen clocks. This information could not have been obtained in any other way.

To remove obstructions such as water hyacinth and moss from the canals, a "canal buggy" was developed. This ingenious machine, very different from the amphibious weasel, travels by land and water. It has four giant wheels about 8 feet in diameter and 2 feet through. They are spools, the type telephone mechanics use for transporting cable, converted into wheels. These spools operate in water and on land. Cleats are bolted on cross-wise to provide traction when traction is needed; and fins are provided for purposes of navigation.

Lamar Johnson, manager for the Everglades Drainage District, designer of the canal buggy, had this to say about it: "We tried to use airplanes to spread 2-4-D plant poison in canals heavily infested with hyacinth and other growth. But we usually got too much wind drift, making airplanes unusable in farming areas. With this outfit we can go through the worst infested canals and when we get through once, it is an easy matter to spread necessary chemicals from an ordinary boat."

People living in the South Glades about the tip end of the Florida peninsula have to deal with still other Glades problems, but there is one notable exception. The soil, consisting of marl of varying depth over the basal rock, is not subject to subsidence.

The principal agricultural problem in this section is to maintain a sufficient head of fresh water to hold back salt water from the sea. Along the major canals emptying into the sea, it is estimated that 60 to 75 percent control is obtained with a gate system that works to hold out sea water and hold in land water (fresh water). Control is not complete, as yet, because some of the smaller canals and ditches empty directly into salt water.

Driving through the rock-land area, the local Soil Conservation Service technician, M. H. Galatir, said, "You can't compare this lower peninsula country with anything else. The soil here is almost invisible in places, hidden away in pockets within holes in the basal rock. This rock, frequently outcropping, is rarely covered with more than a few inches of soil.. .

"This country is changing fast. Many of our farmers are staying here the year round. They used to come in and try to make a crop. Many failed and moved out. That's all changing. Acreage in truck crops around Homestead has doubled since 1945, and fruit growing is also expanding rapidly. Let's talk to some of our outstanding fruit growers."

The first grower interviewed was B. Heath Holden, manager of a grove comprising about 1,200 acres, 4 miles northwest of Homestead.

"We have about 650 acres of fruit," said Holden, "roughly about one-third avocados, one-half limes, and the rest mangoes. An inch of rain here lasts hardly a week and organic matter is rapidly exhausted in this climate. Normally, we irrigate part of our plantings, starting the middle of November and continuing through May.

"We depend very largely on supplying needed fertility. Much of the ground was almost raw rock when we started. We may have had a little nitrogen, but there was almost no potash or phosphorous. We are beginning to build up our humus supply with cover crops. Ours is a young industry, with many unanswered questions, especially with



Water-level control plot at Everglades Experiment Station. The channel in foreground is held at 12-inch depth for high production of sugarcane variety Fla. 31-962, shown here. Photo by Everglades Experiment Station.

respect to disease control. And we are still not sure how much irrigation pays, but we are looking carefully into this matter, with assistance from the Soil Conservation Service."

Driving north from Homestead, we stopped by a field recently prepared—by scarification—for planting. Examination showed that the rock had been broken up into a mass of fragments to a depth of about 6 inches. As meager as was the supply of organic matter, each fragment was coated with a thin covering of adhering particles of decomposed vegetable matter.

Some farmers use bulldozers to break up (scarify) the porous rock, sometimes as deep as 18 inches. It's rather expensive, but more and more of it is being done. Still other farmers scarify the rock in trenches about 2 feet wide. These trenches cross the fields at right angles and the trees are planted at the intersections of the trenches. They must be planted at just the proper depth with respect to the water table. A few inches too high or too low may cause trouble.

As we drove northward with a land-capability map on our knees, Gallatin remarked, "You can see how this map saves us a lot of explaining. Just Saturday morning, two fellows came through here looking for land for rice and cattle. I showed them this land-evaluation map, which seemed to give them the information desired. They said, 'We've been running over this State for 2 weeks and nobody ever called attention to this land map. It's just what we need.'"

"To the north of us," lower Peninsula agriculturists say, "the country has probably approached its agricultural zenith; down here in this southern tip of the Peninsula we are just getting well under way, but we are determined to make all possible progress by using our lands properly."

**FRIENDSHIP PROJECT.**—A Georgia work unit conservationist has been selected by the New York *Herald-Tribune* as a good-will emissary to India. Paul P. Patten, of Carrollton, left November 10 under auspices of the *Herald-Tribune* and OFAR for a 5-week visit in company with an Indian citizen who was brought to Carroll County, Ga., by the *Herald-Tribune* on a similar mission. Earlier this week Patten appeared on the *Herald-Tribune* Forum in New York City and talked about his work as an SCS employee in Georgia. The forum talks were presented before an audience of several thousand in New York and broadcast over two national networks.



Wallman and Taylor compare soil-moisture content of soils mulched by sawdust, and unmulched.

## SAWDUST MULCH RAISES YIELD

**A** YOUNG Sonoma, Calif., farmer, Alvin J. Wallman, uses sawdust mulch to grow more figs.

Many farmers stoke up with sawdust or use it to bed down stock, but Wallman, like more and more western farmers, has found that it can be made helpful to the land.

This 24-year-old farmer started using sawdust somewhat by chance 2 years ago. Someone sold him horse manure mixed with wood shavings. He liked the way the shavings held moisture. The next year he mulched all his fig trees with a 4-inch layer of sawdust bought in town. It worked so well that he became the top sawdust booster in the Sonoma Valley Soil Conservation District.

By mulching with sawdust last year, Wallman (a) produced 30 percent more Black Mission figs; (b) stored up enough moisture to cut irrigation to once in 30 days instead of every 10 days; (c) ended cultivating, diskng, or plowing.

Mulching is easy as Wallman does it. He dumps a pile of sawdust beside a tree row. Then he floats it down the row and under trees with a cultipacker. He uses a fork to spread the sawdust close to trees. Cranshaw melons are grown between the tree rows.

Wallman has a quick and convincing way of demonstrating the value of sawdust as a water saver. First, he spades up a shovelful of bone-dry un-



Technician Taylor, Farmer Wallman and son, visit Black Mission figs mulched with sawdust.

mulched soil. It looks as though it might have come from King Tut's tomb, seemingly without a drop of water. Then, he digs up some mulched ground that hasn't been watered in several weeks. The soil crumbles in your hand, feels good and moist—even a bit dampish. Most farmers who handle the moist and dry soils decide to adopt sawdust or shavings.

The sawdust can be made still more useful by the addition of fertilizer. Sawdust saps the soil of nitrogen. Hilton Taylor of the Sonoma headquarters of SCS explains that Wallman's mulch needs fertilizer to restore nitrogen removed by sawdust. He points out that 200 pounds of ammonium sulphate per ton of sawdust is about right for Sonoma County.

Wallman has turned his farm into a sort of "mulching clinic" for testing sawdust. He thinks that the several kinds of livestock-bedding material he is trying out this year will give a good line on sawdust mulch. He likes the way mulched livestock bedding is working out so far. He also has high hopes for the mulching and crop-building values of sawdust mixed with chicken manure.

Wallman knows that deep soils would be better for fig trees. Even sawdust mulch can't put a shallow soil in the deep-soil class. But mulching, he is convinced, does both shallow and deep soils a lot of good.

**HOMES FOR WILDLIFE.**—"Woodsman, spare that den tree!" is suggested by the tag reproduced here, which the directors of the Benzie (Mich.) Soil Conservation District provide for landowners.

Because woodland and wildlife areas make up over 40 percent of the planned land use in the district, wildlife management is highly important. The district recommends that an average of two den trees per acre be left standing—hollow trees which are now or may become the homes of squirrels, raccoons, a variety of birds, and other wildlife.

The tags are used by technicians, the county agent, directors, landowners, and others to mark trees that should be left for den trees in the process of working out the complete farm plan.

The directors of the district—Donald Gray, Verne Hopkins, Ellsworth Esch, Roscoe O'Blenis, and Eugene Stone—have wildlife and woodland management interests, as evidenced by their five farms, totaling 2,400 acres, of which 1,011 acres, or 42 percent of the land, are classified as woodland and wildlife.

## LEAVE THIS FOR A WILDLIFE DEN TREE

Owner \_\_\_\_\_

Cooperating with

Benzie Soil Conservation District

# NEWSPAPER RECOGNIZES TOP DISTRICTS

THE farm editor and promotion manager of the *Omaha World-Herald* in November distributed another \$5,000 to soil conservation districts.

They have been doing this each year, starting in 1945.

With the 1951 round of presentation banquets, the *World-Herald* has presented \$35,000 to soil conservation districts in 7 years. Ten awards of \$500 have been made each year. One district won the award twice. That makes a total of 69 districts that have received \$500 awards.

Most of these winning districts are in Nebraska, a few in southwest Iowa.

Now something new has been added. The *World-Herald* last year opened up a new classification of awards to the previous award-winning districts.

This new phase of the program is limited to districts that have won \$500 awards. It is based entirely on the activities and accomplishments of the governing bodies of the districts. No cash is involved, but a bronze plaque is presented at a banquet held in the district. Four such awards are made, three in Nebraska, one in southwest Iowa. Members of the boards of supervisors (commissioners in Iowa) are honored guests and a spotlight is thrown on the district as an enterprising agency of local self-government.

The *World-Herald's* activity in soil conservation got underway soon after *World-Herald* publisher, Henry Doorly, read Louis Bromfield's "Pleasant Valley."

The Bromfield book set Doorly to thinking about the future of American agriculture if erosion were allowed to run unchecked, and mishandling of the land continued.

More specifically, he thought about what would happen to the great agricultural territory in which the *World-Herald* circulates.

The land, he reasoned, is the spinal cord of every business in Omaha and in the smaller cities and towns of the Midwest.

Until the past few years, especially before the soil conservation principle had been translated into

the concrete action of soil conservation districts, conservation had been regarded by a majority of farmers as a more or less academic thing. Conservation was a word you associated with Gifford Pinchot and Teddy Roosevelt or with Hugh Bennett and Nebraska's own George Condra, but didn't get very excited about.

Newspapers hadn't pitched in actively to put across this idea of conserving the soil. But Doorly thought they should. The waste of soil was something they ought to be concerned about. It seemed to him that here was a field of opportunity for newspaper service.

The *World-Herald* talked to men in the Soil Conservation Service and members of the State Soil Conservation Committees in Nebraska and Iowa.

Among them they decided that one of the ways a newspaper might best help soil conservation was to tell the story of what needed to be done, how it could be done, and tell it to all its readers, farmers and cityfolk alike.

They decided also that soil conservation might be enhanced by setting up a program of awards and recognition to people who were doing the best jobs of actually putting conservation on the land—using the land according to its capabilities and treating it according to its needs.

The newspaper's management was thoroughly sold on the soil conservation districts idea—the enlisting of farmers in their own organizations to solve their own conservation problems with technical guidance supplied by the Soil Conservation Service.

It was a logical step to build an awards program around the soil conservation districts. And it was decided that any money presented by the newspaper would go to the district as an organization to help it finance its conservation job in its own community.

The *World-Herald* never has considered its \$5,000-a-year contribution to soil conservation as a prize fund. Rather, it prefers to consider this contribution as capital for the soil conservation districts to put to work as quickly as possible in ways which it leaves completely to the discretion of the district governing body.

Virtually all of the money has been put to work for soil conservation in one way or another. Some districts have used their awards to buy equipment—terracing machinery, tree planters, grass seeders. Some have emphasized equipment that would assist

them in a better educational job. They've bought cameras and projectors for showing slides or movies. Many have supplied soil conservation booklets to schools.

For one Nebraska district, the \$500 award added the capital necessary to lease a run-down, sandy farm and set up, in conjunction with the Extension Service and the Soil Conservation Service, a demonstration farm to show improved land-use practices that could be applied profitably to similar sandy, problem land in the district.

In other districts with short treasuries (districts in Nebraska and Iowa can't levy taxes) the award money made a down payment on equipment that was put out for hire and over a period of 2 to 3 years earned enough to multiply the original investment two or three times, while building terraces, shaping and seeding waterways, and otherwise putting the brakes on soil erosion.

This is the kind of conservation progress the *World-Herald* is proud to have a part in, for it means that more people every year are doing something about putting conservation on the land. It also means that eventually conservation farming will become the rule and everyone dependent on the soil can rest assured that this basic resource is being maintained.

At the beginning of 1945, the year the *World-Herald's* soil conservation program was started, Nebraska had 52 soil conservation districts. In the next 5 years 35 more were organized and the State was completely covered with districts. Nebraska was the first State west of the Mississippi River to reach this goal.

When the *World-Herald* started its program, all of the 15 southwest Iowa counties in its circulation territory had organized districts. With this fall's award program, 13 of them will have received \$500 each.

Included among the Iowa districts that won *World-Herald* awards are the three which later won the State-wide awards presented for 3 years by the Goodyear Tire & Rubber Co. in its soil conservation program.

An Iowa conservation official, asked if he thought the *World-Herald* program had accomplished anything for conservation in southwest Iowa, pointed out that all of the Iowa Goodyear winners were districts that had been included in the *World-Herald* program, and declared:

"I wish that we had the help of such a program in some other parts of our State."

In the cash-award phase of the *World-Herald* program, the district award is based on the conservation work of individual farmers. Three farms are selected by the district boards, from nominations which anyone can make, to represent the district.

These may be owner-operated or tenant farms. The farms are judged on their land-use program, the completeness of their conservation program, and the complexity and effort involved in achieving it.

On this same basis the districts are judged against each other and the 10 best selected yearly.

At the award banquets, always held within the winning district, the individual farmers are presented recognition certificates, neatly inscribed and framed. Owners and tenants receive the certificates and their wives and families are banquet guests. Corsages are provided for the wives of honored farmers.

Districts that win the \$500 award do not compete again for the same award. This was not the case originally, and one district won the award twice. But a big splurge in district organization and the feeling that the older established districts had too much edge on the new districts prompted the paper, in conjunction with the State Soil Conservation Committees, to limit competition for the \$500 award to districts that hadn't won it.

This limitation, plus a desire to emphasize work of the conservation district governing boards, led to establishment last year of the new phase of the program limited to districts that have won the \$500 award and based entirely on district accomplishment.

Throughout the year the *World-Herald* prints many stories and pictures dealing with soil conservation. It has published several tabloid-size conservation sections. Its conservation promotion has gained many new friends far and wide.

At one of the first recognition banquets in the *World-Herald's* program, a farmer selected to be honored complained that he had done nothing to win an award.

"I haven't done anything any other farmer couldn't do," he said.

The *World-Herald*, in story and picture, has been emphasizing that point ever since.

# WATER CONSERVATION AIDS HEALTH

By CHRIS A. HANSEN



Mosquito-producing source outside of irrigated field, resulting from water runoff.



Sumps may be important mosquito sources within the field.

**B**AD irrigation may lead to bad health. We now know that certain diseases are traceable to poor handling of water in agricultural areas.

Certain mosquito-borne infections, including virus encephalitis (human and equine strains), are more prevalent in Western States than in any other part of the country. The species of mosquito, *Culex tarsalis*, the principal vector of encephalitis, as well as many other species, is found in abundance in this area. Mosquitoes breed in water other than that associated with irrigation, of course, and are found in nonirrigation areas. However, *C. tarsalis* mosquitoes are particularly adapted for breeding in irrigation water and are found in abundance in most irrigation areas in the western United States.

Note.—The author is sanitary engineer director; chief, engineering branch, Public Health Service, Atlanta 5, Ga.



Clogged drainage ditches favor mosquito production.

Other genera of mosquitoes known to abound in the irrigation agriculture areas in the West are *Anopheles*, *Aedes*, and *Psorophora*. In a section of the San Joaquin Valley, Calif., as many as 20 million eggs of a nuisance mosquito (*Aedes nigromaculatus*) have been found in a single acre of irrigated pasture.

India offers perhaps the most dramatic example of how irrigation agriculture can yield at the same time both priceless benefits and tragic byproducts. In that vast country nearly 100 million people are spared the suffering of famine by food produced through the irrigation of arid land, and millions of those same people are afflicted with malaria transmitted to them by mosquitoes which, in large measure, breed in water associated with irrigation projects. Thus water that makes it possible for millions of people to escape starvation also makes possible the production of mosquitoes which carry disease to many of those same millions.

In the United States neither the benefits nor the negative byproducts of irrigation are so spectacular, of course, but the principles and the end results are similar. Irrigation agriculture is practiced on a considerable scale in the United States, principally in the States west of the Mississippi River. Some 22 million acres of arid and semiarid land have been brought into agricultural production through irrigation and made to yield bumper crops of grains, fruits, vegetables, and livestock forage. This means that irrigation is vital to our national economy and contributes to dietary balance for millions of people.

Conservation irrigation is defined by the Soil Conservation Service as "simply using irrigated soil and irrigation water so as to obtain high production without waste of either soil or water." That is something that public-health workers endorse with complete enthusiasm, for the use of water without waste reduces greatly the number of disease carriers. The more efficient the application of conservation measures to the land, the better will be the health of people living on the land. It is the commonness of corrective measures which underlines the practical soundness of the partnership of conservationists and public-health specialists in urging conservation irrigation as the remedy for evils associated with irrigation.

Public-health investigators have found that waste water is a major source of mosquito production associated with irrigation agriculture. One investigator has labeled *waste* water as 95 percent of the mosquito-production problem. Conservationists say the misuse of irrigation water threatens the continuing productivity of more than half of the acreage under irrigation in this country, and wastage of water is high on the list of water-misuse practices. Too much water improperly delivered to soil causes erosion, leaching, or waterlogging and at the same time provides pools, ponds, and backwater favorable for mosquito production.

As yet incomplete studies by Federal and State health authorities indicate that the greatest production of mosquitoes associated with irrigation agriculture occurs in downstream areas rather than in upstream areas such as reservoirs and main distribution canals. Accordingly, the brochure, "Mosquito Prevention in Irrigated Areas," emphasizes the mosquito-producing potential of surface-water collections within fields, and accumulations due to runoff from fields, and lists the following as some of the major causative practices:

- (1) Excessive use of water.
- (2) Absence of adequate drainage system.
- (3) Inadequate grading and leveling of land prior to irrigation.
- (4) Improper field lay-out.
- (5) Inadequate maintenance of ditches.
- (6) Faulty design of irrigation structures, or inadequate maintenance of such structures.

Nearly all of these factors, and often others, are associated with irrigation where mosquito production is abundant. And conservationists recognize



*Culex tarsalis* mosquitoes breed in grassy seeps adjacent to canals.



Waste water from irrigated fields may accumulate in roadside ditches and provide mosquito-producing habitats.

them as describing practices which add up to damaged soil, depleted water supply, and gradual lessening of soil productivity.

Irrigation of pastures, widely practiced in some areas, is responsible for the production of a stupendous number of mosquitoes, since there is often too little thought given to preparation of land and as little to the gaging of water supply and distribution pattern. Water accumulates in lowlands and mosquitoes breed there by the millions. In one such area mosquitoes came to rest on the back of a gloved hand at the rate of 70 per minute.

In terms of both health hazard and damage to soil, excessive use of water is one of the most wide-

spread mistakes among irrigators. Water often is scarce and always a cost item which argues for its conservation. Yet, there are many areas where less than half of the water applied actually benefits growing crops, and public health investigators find swarms of mosquitoes emerging from waste water that would not be there if irrigators measured the flow of irrigation water.

Canal leakage or seepage, often due to improper construction of the distribution system, is another prime cause of mosquito production and also of damage to soil. In aggravated cases, where open ditches are used for delivery of the water, losses through leakage or seepage may reach as high as 70 percent and the average is estimated at around 35 percent. Such water gravitates to low land where it accumulates in sumps, ponds, roadside ditches, and the like, to form excellent breeding places for mosquitoes. And again, the same water that promotes mosquito production also destroys productivity of the land through erosion, alkali accumulations, leaching, or waterlogging. Rehabilitation of the irrigation distribution system through improvement of design, including provision for lining, and clearing vegetation from canals, discourages seepage and eliminates damage therefrom.

The listing of practices which subtract from the net benefits of irrigation agriculture by producing mosquitoes and damaging soil could be extended and matched with a comparable list of easily applied corrective measures. But that is hardly necessary here. Instead, those interested in pursuing the subject are referred to "Conservation Irrigation" (Agriculture Information Bulletin No. 8.) for the definition of conservation irrigation and what it means for irrigationists; and to the brochure "Mosquito Prevention in Irrigated Areas" (Communicable Disease Center, United States Public Health Service) for what conservation irrigation means in terms of public health.

## NEW GROUND COVER

(Continued from page 128)

more information about getting stands of Pensacola Bahiagrass by both fall and spring seedings. We want to know whether or not farmers can depend on the grass to come up to thick stands when seeded at normal rates at the last cultivation of cotton or corn. We want to know whether it will be a safe practice to sow Pensacola Bahiagrass and

reseeding crimson clover together in late October or early November following the harvesting of peanuts.

We need additional information about the management of this sod in rotations. A few farmers already have this sod on considerable acreages of their better cropland. Most of them will want to plow these fields and cultivate the land for cotton, corn, or peanuts. They will want to plant grass and clover on other land. We want to get the information about the use of this sod in rotations by the time farmers need it.

## PROPERTY AND LIVES

(Continued from page 122)

Had the 1946 costs per mile prevailed in the 1951 fiscal year, the Service would have had to expend \$26,142 additional for automobile travel and \$272,447 more for the operation of pick-up trucks.

Over the years the Service has gained an enviable reputation for conservation of human resources as well as for conservation of soil. Very early it began developing techniques aimed at preventing accidents to workers.

During those early days the Service injury rate was nearly twice as high as the all-industry rate. Now, however, it is only about half the all-industry rate—this, while industry itself cut its rate in half. Similar results have been accomplished in reducing the rate of motor-vehicle accidents. This all adds up to conservation of human resources—the lives of trained and experienced technicians.

Today, the Service is over five times as safe a place to work as it was at the outset, *and twice as safe as the average industry*. The Service is still improving its methods, determined to continue as a leader in safety. It has adapted all the applicable devices and methods worked out by professional safety engineers throughout the country. Study and analysis of accidents, safety committees, safety officers, inspections, publications, awards, training, and protective equipment have all been used effectively.

**MORE MILK FROM FEWER COWS.**—Jake Rogers of the Anderson work group in South Carolina says: "After establishing a permanent grass program on my farm, I am getting the same milk from 28 cows that I was getting from 43 cows, with one-half the labor." Rogers is getting 100 gallons of milk per day.

# REVIEWS

**FORESTRY IN FARM MANAGEMENT.** By R. H. Westveld and the late Ralph H. Peck. Second Edition. Revised by R. H. Westveld. 340 pp. Illustrated. 1951. New York: John Wiley & Sons, Inc. \$5.

The title accurately presents the contents of the book, which recognizes and treats the woodland as an integral part of the farm. The author does not present any new forestry facts or principles but he does select those forestry practices that would best fit a farm woodland, and presents them in such form as to be more readily understood and used by the farmer. This adjustment of forestry techniques to farm woodlands can also be good reading for the professional forester who works with the smaller woodlands.

The first three chapters are aimed at getting the farmer acquainted with the woods on his farm and outlining some of the factors to be considered in its management. Including farm labor and equipment as an income factor, just as in other farm crops, is a commendable point in discussing returns from farm woodland. Definitions of forestry terms are clear and well identified with the farm forest.

In chapter 4 the author sets forth the objectives of managing farm woodlands to obtain maximum benefit from those woodlands for all time. The benefit may not necessarily be limited to production of highest quality wood products, but may also be the conservation of soil and water, and increased wildlife.

Of particular value is the attention given to the care and management of immature woodlands. The favoring of well-formed species of low value over poor-quality species of high value and the development of an uneven-age stand by selective cutting are emphasized as applying specifically to handling farm woodlands. More detailed presentation of the D+ principle of stand regulation, now proved by farmer use, would have been useful as a specific cutting and management guide.

Two chapters of rather detailed treatment cover methods of measuring wood products, along with volume measurement of the woodland and means of determining growth rate.

The chapters "Wood Products," "Marketing," "Best Use of Wood on the Farm," and "Management for Specific Products" are all clearly presented and well illustrated. These chapters have more direct application to areas east of the Great Plains.

Tree planting is well covered, but the farmer will need to check local practices before proceed-

ing. This revised edition has included descriptions of mechanical equipment now in common use. Improved techniques in Christmas-tree production, turpentine farming, and preservative treatment of wood are also well explained.

The importance of preparing a simple woodland plan that is included as part of the complete farm plan is stressed. Readers acquainted with the development of woodland planning and application of practices will likely note the author's omission of the Soil Conservation Service as an agency also providing on-the-ground assistance to farmers with woodlands.

The book reflects the author's background of experience in teaching and also his understanding of the special characteristics of farm forests, as distinct from large commercial forests. Italicizing key sentences is very effective. The lists of selected and cited references at the end of each chapter are helpful in making a more complete study of any particular subject. The appendix carries useful reference facts in convenient tables. The farmer-reader will be rewarded with a clearer understanding of what to do with his woodlands and how to do much of it himself.

C. B. MANIFOLD.

## NOTES FROM THE DISTRICTS

**GREENED UP THE GROUNDS.**—A lot of people had talked about the bare condition of the Trousdale County courthouse yard at Hartsville, Tenn., but nobody had done anything about it. Finally, the board of supervisors of the Trousdale County



Shovel work on courthouse grounds by supervisors of the Trousdale County Soil Conservation District.

Soil Conservation District decided to take improvement of the courthouse yard as a project to call attention to their third annual Soil Conservation District Week, October 7 to 13.

The supervisors came together one day in August, well in advance of the scheduled event. They hauled in several loads of topsoil, applied lime and fertilizer, and seeded the lawn to bluegrass, white clover, and Kentucky 31 fescue. Then they set up low posts and stretched wire around the plot. The work—and the results—created a good deal of favorable comment.



Viewing the results with pride are J. L. Bullard, district chairman; Marshall Gregory, Ray Colson, John A. Walker, work unit conservationist; Henry Smith, vice chairman; and William Dalton, secretary-treasurer.

**SOCIETY HONORS TWO.**—In the first action of its kind in Pennsylvania, the Keystone Chapter, Soil Conservation Society of America, has cited two farmers for their conservation practices and leadership. They are Mark D. Witmer, Dalmatia, Northumberland County Soil Conservation District, and Donald T. Smith, Falls Creek, Jefferson County Soil Conservation District.

Witmer has a 285-acre farm with 88 acres in contour strip cropping, 2,600 feet of sod waterways, 30 acres of improved pastures, 69 acres of managed woodland, 8 acres of wildlife cover and shrubs, and a farm pond that gives fire protection for three sets of buildings. He is widely known for large-scale poultry operations, and also has 60 head of dairy cattle, 50 hogs, 25 acres of apples and peaches, and a large acreage of general farm crops.

Smith operates a 375-acre farm, with 150 acres under cultivation, and has established all recommended practices in his plan. He has 24 dairy cows, a herd of Hereford beef cattle, and poultry. He is chairman of his district, which has 800 members, is vice chairman of the Pennsylvania Association of Soil Conservation Districts, and is a PMA committeeman.

**FARMERS' QUARTET.**—There's music in the air around Winona, Minn., these days. Four farmers in the local soil conservation district have organized a male quartet and have set soil conservation to music, thereby proving it can be not only profitable but enjoyable.

The four farmers, Russell Wirt, 19; John Nettleton, 23; Phillip Radatz, 20; and Charles Radatz, 28, are all related, either first or second cousins. They are of sturdy Pennsylvania Dutch stock and their great-great-grandfather moved to Winona County in 1855, homesteading a farm still in the family. It is owned by E. J. Wirt, Russell's father.

All of the quartet have Guernseys. Charles Radatz was elected director of the Southeastern Guernsey Breeders' Association not long ago.

All members belong to the Church of the Brethren, and for some time they have been singing at church, at cooperative meetings, and at similar community events.

Soil conservation first came into the quartet's repertoire in connection with the retirement of John Staley, veteran district conservationist at Winona.

They sang a parody of "Old MacDonald Had a Farm" at Staley's "going-away dinner" and it was an instant hit. A few weeks later they were asked to sing it again at the annual meeting of the Minnesota Association of Soil Conservation District Supervisors.

Charles Radatz operates the home farm of 145 acres which he bought from other members of the family, while Phillip Radatz and John Nettleton operate 120-acre farms owned by their mothers.

Last of the quartet to develop a complete soil and water conservation plan was Charles Radatz, who started erosion-control practices in 1944. In 1948 he won the *Minneapolis Star and Tribune* Soil Conservation Contest for having the most complete program applied on the land.

—R. H. MUSSER.



Left to right: Charles Radatz, Russell Wirt, Phillip Radatz, John Nettleton.



Mr. and Mrs. Harmon in living room paneled from wood taken from site of farm pond.

**VARIED DIVIDENDS FROM POND.**—Some of the most valuable land on the farm of Arthur Harmon, in the Spartanburg (S. C.) Soil Conservation District, is covered with water throughout the year. Harmon has a farm pond which provides fish, fun, and profit more than enough to pay for the fertilizer required to insure a steady supply of fish.

Harmon had a 2½-acre piece of swampy, Class V-a land which was not suitable for proper drainage; at its head was a bold spring which afforded an ample supply of water in all seasons. Worthless for crops, it was an ideal spot for a pond.

The pond was completed late in 1949, and subse-

quently stocked with bream and bass. Harmon started fishing this year. He found the catches so good that he decided to open the pond to the public one afternoon each week for a \$1 fee; such permit-holder can fish until he has landed 10 bream or 3 bass.

In clearing the pond area, Harmon removed 19 different species of trees—sycamore, beech, gum, maple, wild cherry, ash, persimmon, holly, mulberry, and sugarberry. From this wood—so often considered worthless and burned on the spot, or worked up into firewood—Harmon obtained the lumber with which to panel his house.

**CATTLE GAINS.**—Hugh McGee, soil conservation district supervisor of Starr, S. C., says: "By allowing my young cattle to have access to grain in creeps, I am able to realize a gain of 600 pounds of beef per acre per year from permanent grazing crops." McGee has on his farm 21 acres of sericea and orchardgrass in combination, 33 acres of kudzu, 78 acres of fescue, and 67 acres of permanent pasture.

**BUSINESS LOOKS TO EXPERTS.**—John P. Cothran, contractor, purchased a large farm near York, S. C., and placed an order for a large quantity of seed at a seed store in York. He asked the manager to recommend the source of best help in

getting his grazing program set up. The manager referred him to the Soil Conservation Service, which is now working with him in getting his plan started.

A similar instance involved a businessman in Rock Hill, S. C., who purchased a farm and went to Cofer Tractor Co. to investigate the purchase of machinery. Cofer advised him to see the Soil Conservation Service people and get their recommendations for the farm and then come back to see him about the machinery.

John R. Williams, Rock Hill, S. C., realtor, stated that he kept up with all news items about conservation farming in York County and mailed clippings of these to prospective buyers all over the South.